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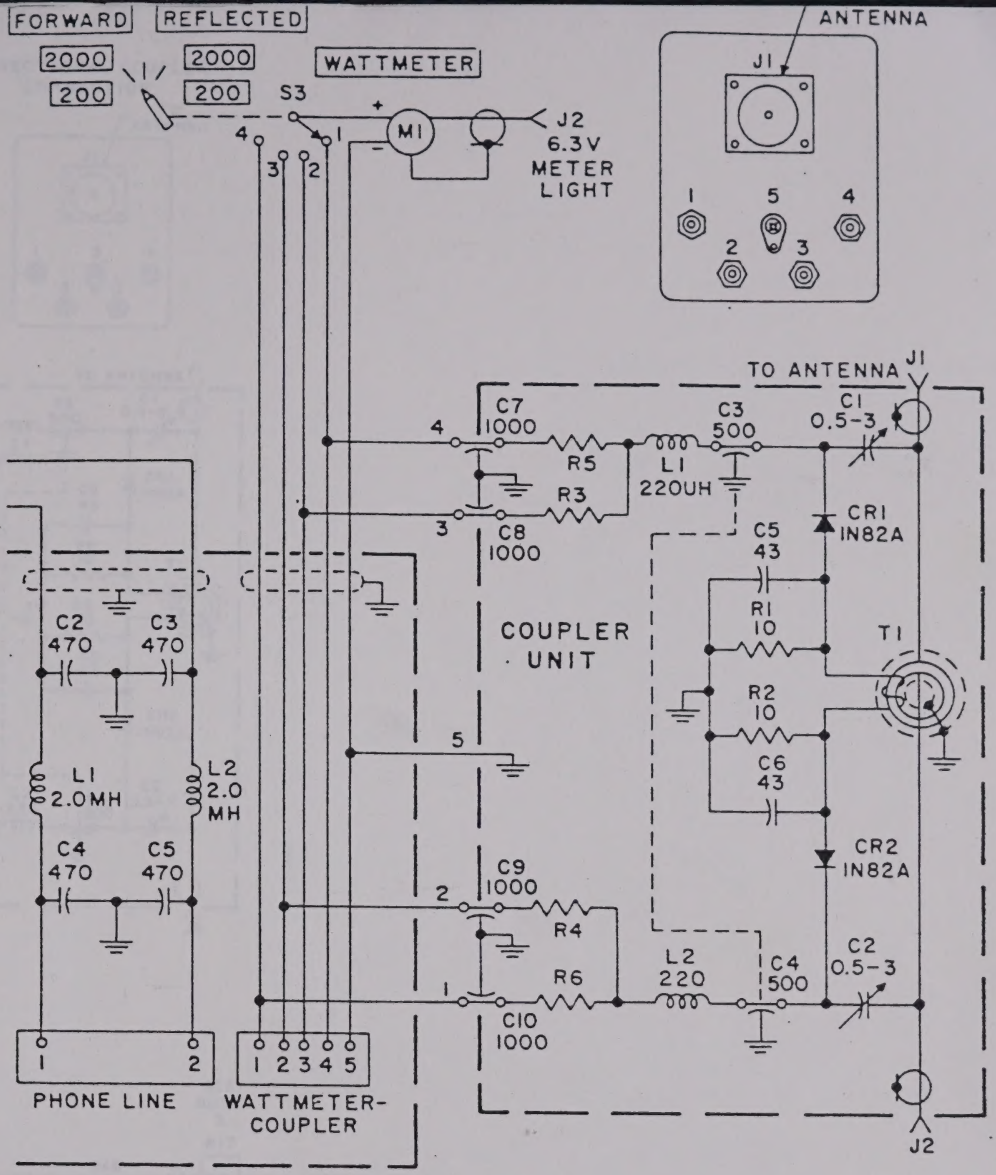
Collins Radio Company

312B-4 and 312B-5 Station Controls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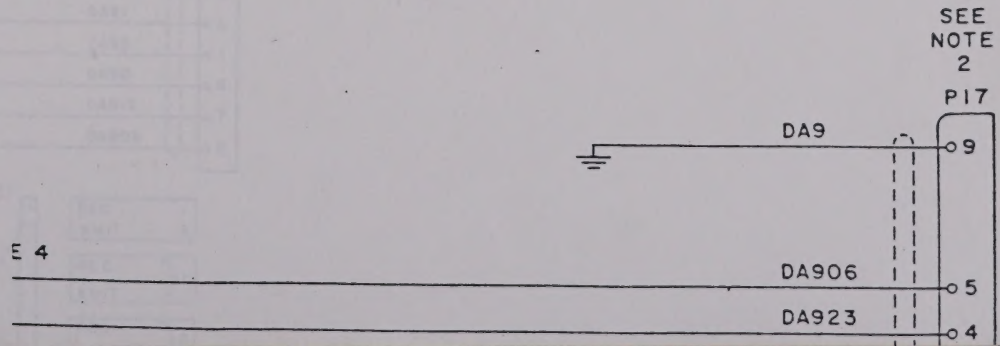
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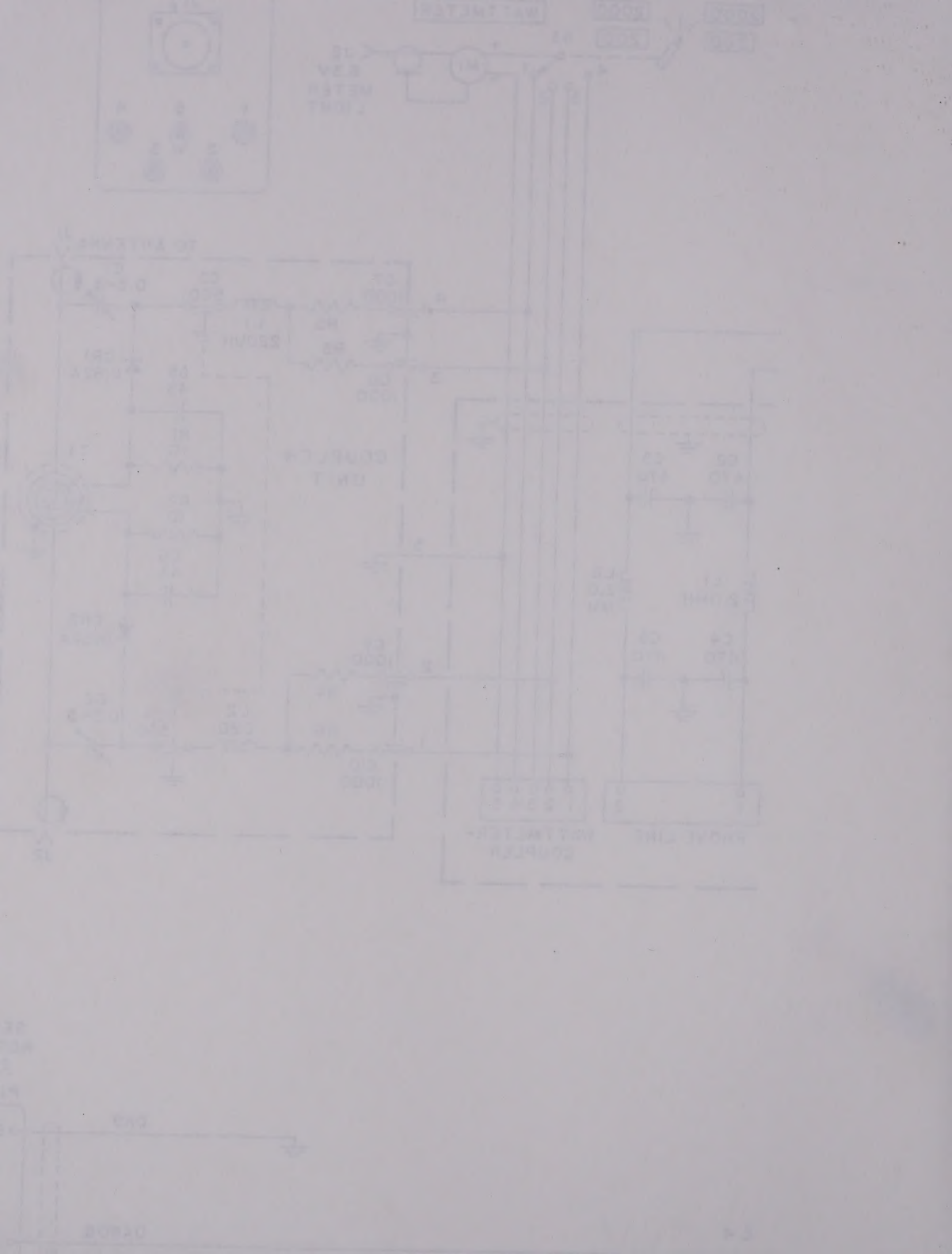

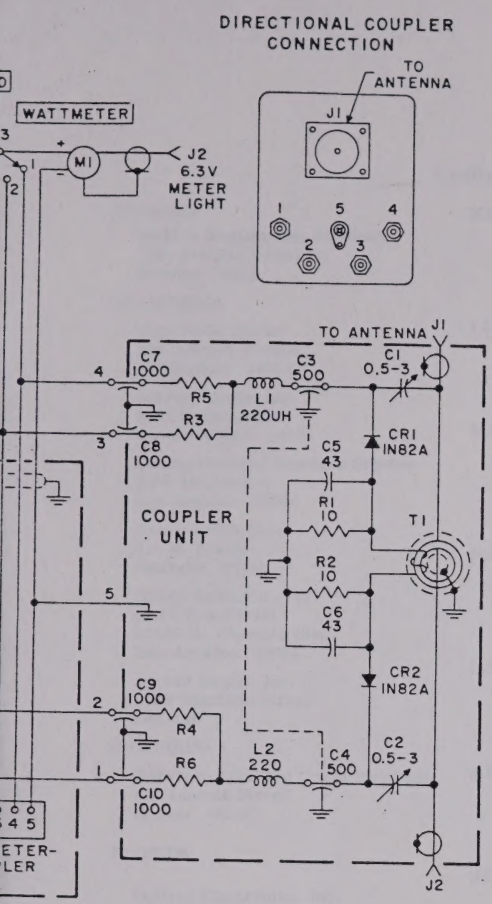
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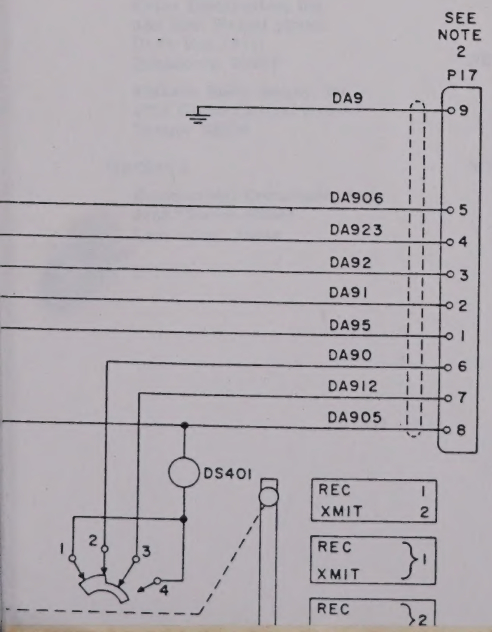
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XMIT
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XMIT
REC

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Anaheim 92801

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Los Angeles 90064

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Engineering Company
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312B-4 and 312B-5 Station Controls

COLLINS

instruction book

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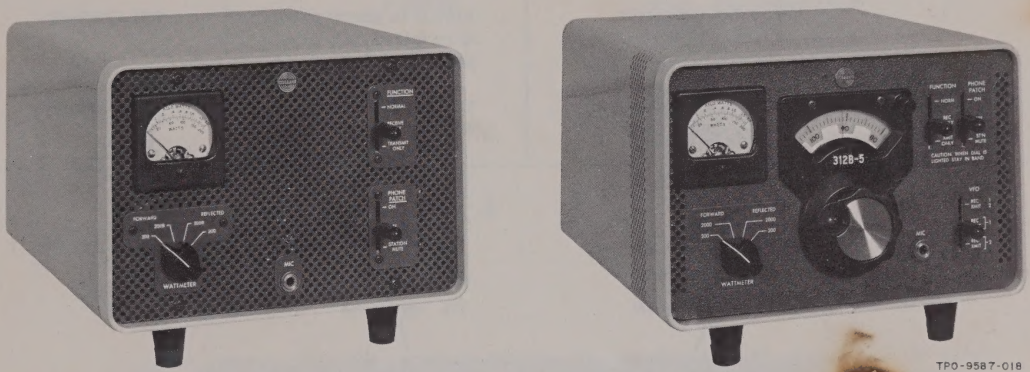

Figure 1. 312B-4 and 312B-5 Station Controls

1.1 Description.

The 312B-4 and 312B-5 Station Controls, figure 1, contain a directional coupler and wattmeter, a speaker, a phone patch, and appropriate switching circuitry. The same types of directional coupler and wattmeter, phone patch, and speaker are used in both the 312B-4 and 312B-5. In addition, the 312B-5 contains an auxiliary variable frequency oscillator to provide separate transmit and receive frequencies when used with the KWM-2 or KWM-2A Transceivers (see table 3).

The wattmeter indicates power levels within the ranges of 0 to 200 or 0 to 2000 watts, forward or reflected. It is accurate over the range of 2 to 30 MHz, but should not be used on higher frequencies. The phone patch includes circuitry which allows VOX phone patch operation. It can also be switched manually if desired. The vfo in the 312B-5 is the same as that used in KWM-2/2A and S-Line equipment. Switching circuits are provided to allow operation of KWM-2/2A Transceivers on different transmit and receive frequencies or transmit-receive operation on the same frequency using either vfo.

Figure 2 shows the location of external connections to the 312B-5. The 312B-4 and 312B-5 are electrically identical except for the absence of vfo connections in the 312B-4. Items which are furnished with each equipment are listed in table 1.

2.1 Installation.

2.1.1 312B-4 WITH S-LINE OR KWM-2/2A.

Connect the phone patch, speaker, and rf wattmeter to the receiver, exciter, and telephone lines as shown in figure 4. If necessary, the directional coupler unit can be removed from the 312B-4 and mounted elsewhere, provided the cable leads are less than five feet long. Figure 7 shows 312B-4 and KWM-2/2A interconnections. Figure 8 shows the proper way to connect the directional coupler to the indicator circuit.

TABLE 1. ITEMS FURNISHED WITH 312B-4 AND 312B-5

QUANTITY	DESCRIPTION	FUNCTION	PART NUMBER
1	Right-angle connector, rf type N	Antenna connection	357-9113-00
1	RG-58C/U cable with phono and N-connectors	Connect transmitter to coupler	426-6026-00
5	Audio cables with phono connectors	Interconnections	426-2027-00
1	Tubular capacitor, 0.5 uf, 200 volts dc	Install in phone patch if required (see note, paragraph 3.1.2.h)	931-0169-00
1 (312B-5 only)	RG-58C/U cable with phono connectors	External vfo connection	426-5076-00

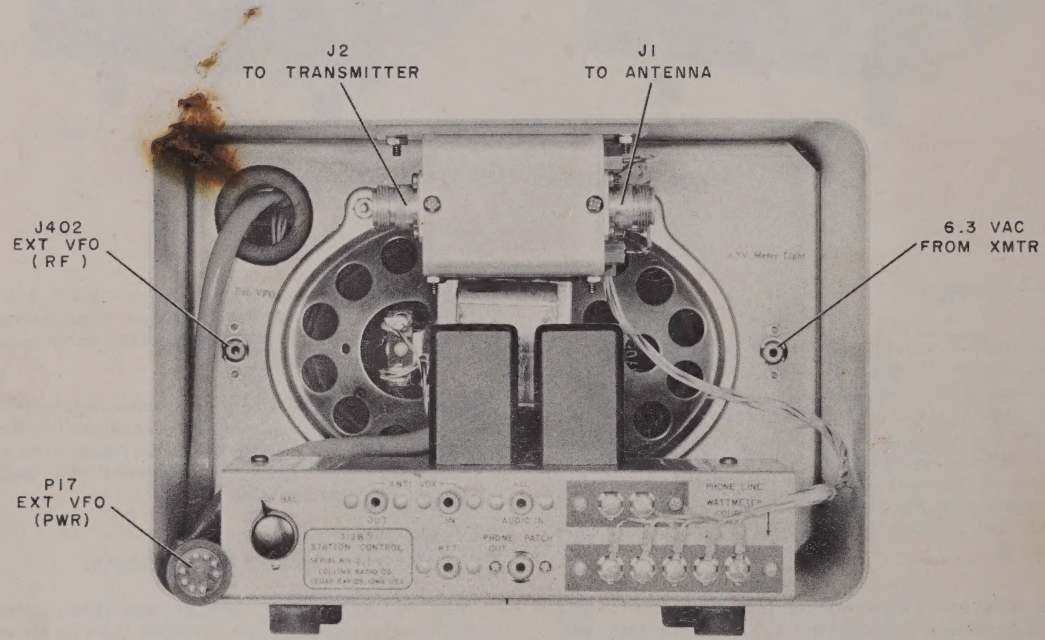

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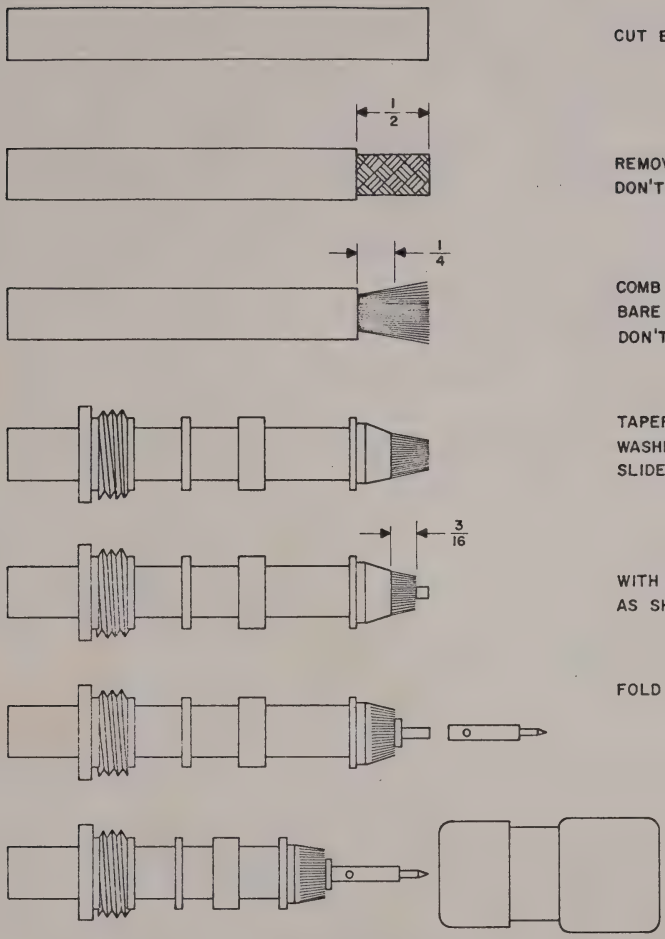
Figure 2. 312B-5, External Connections



CUT END OF CABLE EVEN.

REMOVE VINYL JACKET $\frac{1}{2}$ INCH— DON'T NICK BRAID.

COMB OUT COPPER BRAID AS SHOWN. BARE $\frac{1}{4}$ INCH OF CENTER CONDUCTOR. DON'T NICK CONDUCTOR.

TAPER BRAID AS SHOWN. SLIDE NUT, WASHER AND GASKET ON VINYL JACKET. SLIDE CLAMP ON BRAID.

WITH CLAMP IN PLACE, TRIM BRAID AS SHOWN.

FOLD COPPER BRAID BACK ON CLAMP. TIN CENTER CONDUCTOR, USING MINIMUM AMOUNT OF HEAT.

HOLDING CONTACT WITH PLIERS, SOFT SOLDER CONTACT TO CENTER CONDUCTOR. IT IS IMPERATIVE THAT BACK END OF CONTACT BE FLUSH WITH POLYETHYLENE DIELECTRIC. DO NOT USE EXCESS SOLDER. WIPE CLEAN— SEE THAT END OF CABLE INSULATOR IS CLEAN AND FREE OF SOLDER, ROSIN AND FOREIGN MATERIAL.

SLIDE BODY INTO PLACE CAREFULLY SO THAT CENTER CONDUCTOR ENTERS HOLE IN INSULATOR. FACE OF CABLE DIELECTRIC MUST FIT FLUSH AGAINST INSULATOR. PROPERLY TIGHTEN BODY AND NUT WITH WRENCHES.

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Figure 3. Installation of Type N Male Connectors on RG-8/U Transmission Lines

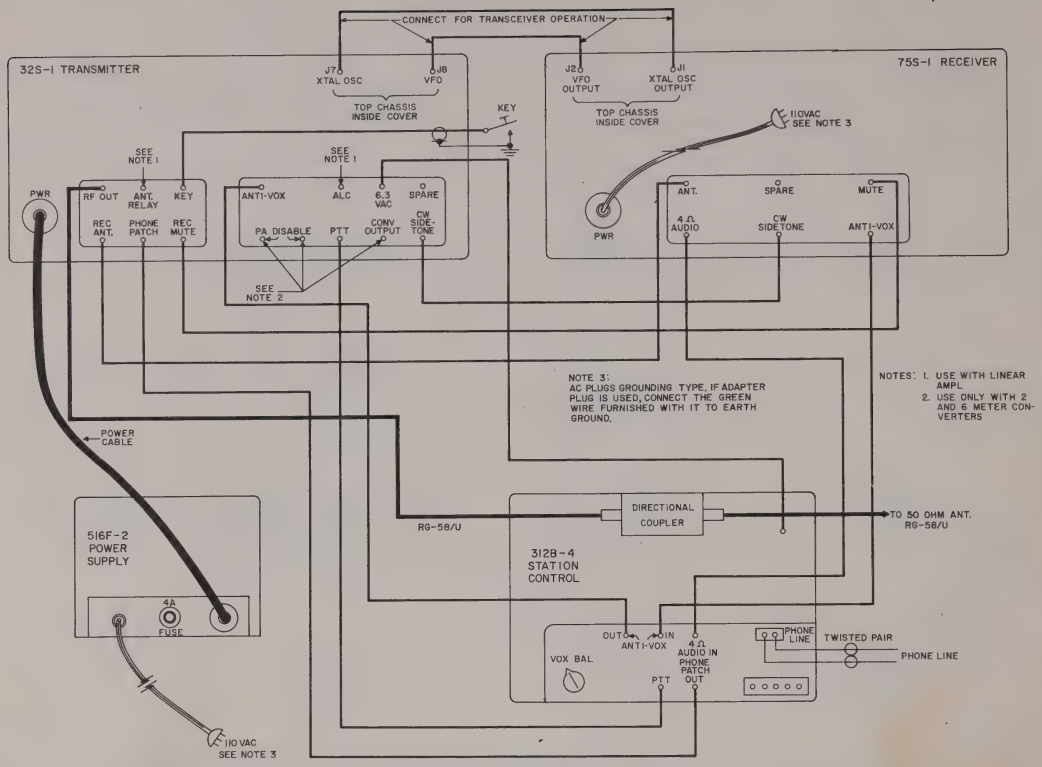

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Figure 4. Interconnections, 312B-4 with S-Line

NOTE

If the phone patch is to be used with a receiver other than an S-Line type, connect the ANTI-VOX IN jack on the 312B-4/5 to a 500-ohm audio output line from the receiver. Use a 500-ohm-to-voice-coil matching transformer if the receiver has no 500-ohm output. Other types of exciters may be used by connecting the PHONE PATCH OUT jack on the 312B-4/5 to the exciter microphone jack. The output voltage at this jack on the phone patch is approximately equal to that of the average high-impedance dynamic microphone.

2.1.2 312B-5 WITH KWM-2 OR KWM-2A.

Connect the power, phone patch, speaker, vfo, and rf wattmeter to the transceiver and telephone lines as shown in figure 6. Use the RG-58C/U cables supplied for the rf connections. These cables are slightly larger in diameter and two inches shorter than those supplied for audio and control functions.

CAUTION

Make sure the vfo power plug is plugged into the proper socket on the KWM-2/2A chassis. This socket is J17 which, for normal operation, has a molded jumper plug inserted in it.

3.1 Operation.

3.1.1 PHONE PATCH OPERATION: 312B-4 WITH S-LINE.

a. If the receiver and exciter are set up for transceive operation, disconnect the patch cables, and restore to fully independent operation.

b. Tune and load the exciter into an antenna or dummy load according to the exciter instruction book.

c. Set the receiver to a different band than that being used by the exciter, and tune to the calibrate signal to produce approximately a 900-Hz audio tone.

d. Lift telephone handset and dial one number to remove the dial tone.

e. Set 312B-4 FUNCTION switch to NORMAL and PHONE PATCH switch to ON.

f. With the exciter set up for SSB operation, set its VOX GAIN control to PTT ON.

g. The tone from the receiver will now feed through the phone patch and modulate the transmitter. Using the rf wattmeter to indicate the magnitude of this feedthrough, adjust the VOX BAL control for minimum rf output. As the null is approached, advance the MIC GAIN control as required to produce a suitable indication on the wattmeter.

NOTE

The phone patch will balance on the average telephone line with the circuit capacities provided. Unusual line conditions may require a change in capacity to compensate for these conditions. If necessary, remove C7 or add the extra capacitor (furnished) in parallel with C6 and C7 to produce a null within range of the VOX BAL control. If varying the circuit capacities does not enable the VOX BAL control to produce a null, it may be necessary to insert a 6-db "H" pad between the phone line and the 312B-4/5. See figure 5 for the circuit of a suitable "H" pad and its connections.

h. Hang up telephone, set PHONE PATCH switch to OFF, and reset transmitter and receiver controls for normal VOX operation. Reconnect patch cables for transceive operation if desired.

i. The phone patch is now ready for use. The normal operating procedure is to call the third party on the telephone, then set the PHONE PATCH switch to ON. If received radio signals are strong, the receiver RF GAIN can be reduced to minimize background noise. Adjust AF GAIN to provide normal level to the telephone line.

j. Depending upon telephone line characteristics and the voice volume of the incoming telephone signal, it may be necessary to make adjustments of transmitter MIC GAIN and VOX GAIN controls. In the case of extremely weak signals from the telephone line or signals with a high hum content, use push-to-talk operation.

3.1.2 PHONE PATCH OPERATION: 312B-4/5 WITH KWM-2 OR KWM-2A.

a. Set EMISSION switch to LSB, ANTIVOX GAIN at minimum, MIC GAIN at minimum, VOX GAIN at minimum, and RF GAIN and AF GAIN as required for normal operation.

b. Set function switch to CAL, and tune in the calibrate signal to produce approximately a 900-Hz audio tone.

c. Set VOX BAL control on 312B-4/5 to full counterclockwise.

d. Lift telephone handset, and dial a single digit to remove dial tone.

e. Set PHONE PATCH switch to ON.

f. Advance VOX GAIN control on the transceiver until the VOX relays begin to trip back and forth between receive and transmit positions.

g. Slowly adjust VOX BAL control until the relays stop tripping.

h. Repeat steps f and g until it is no longer possible to advance the VOX GAIN control without causing the relays to trip. (If phone patch will not balance, refer to note accompanying step g of paragraph 3.1.1.)

NOTE

More precise balancing may be obtained if an ac vtvm is used. Connect the vtvm from the PHONE PATCH OUT jack (J4 on 312B-5) to ground. Slowly adjust the VOX BAL control for a null as indicated by the vtvm.

i. Hang up telephone, turn off phone patch, and reset all transceiver controls for normal VOX SSB operation.

j. The phone patch is now ready for use. Normal procedure is to set PHONE PATCH switch to STATION MUTE and call the third party on the telephone. Switch the phone patch on, and adjust AF GAIN on the transceiver to provide normal telephone line level. If the received signal is strong, the RF GAIN can be decreased to reduce background noise.

k. Depending upon telephone line characteristics and the voice volume of the incoming telephone signal, it might be necessary to make adjustments of MIC GAIN and VOX GAIN. In case of extremely weak signals from the telephone line or signals with a high hum

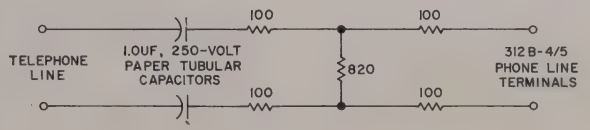
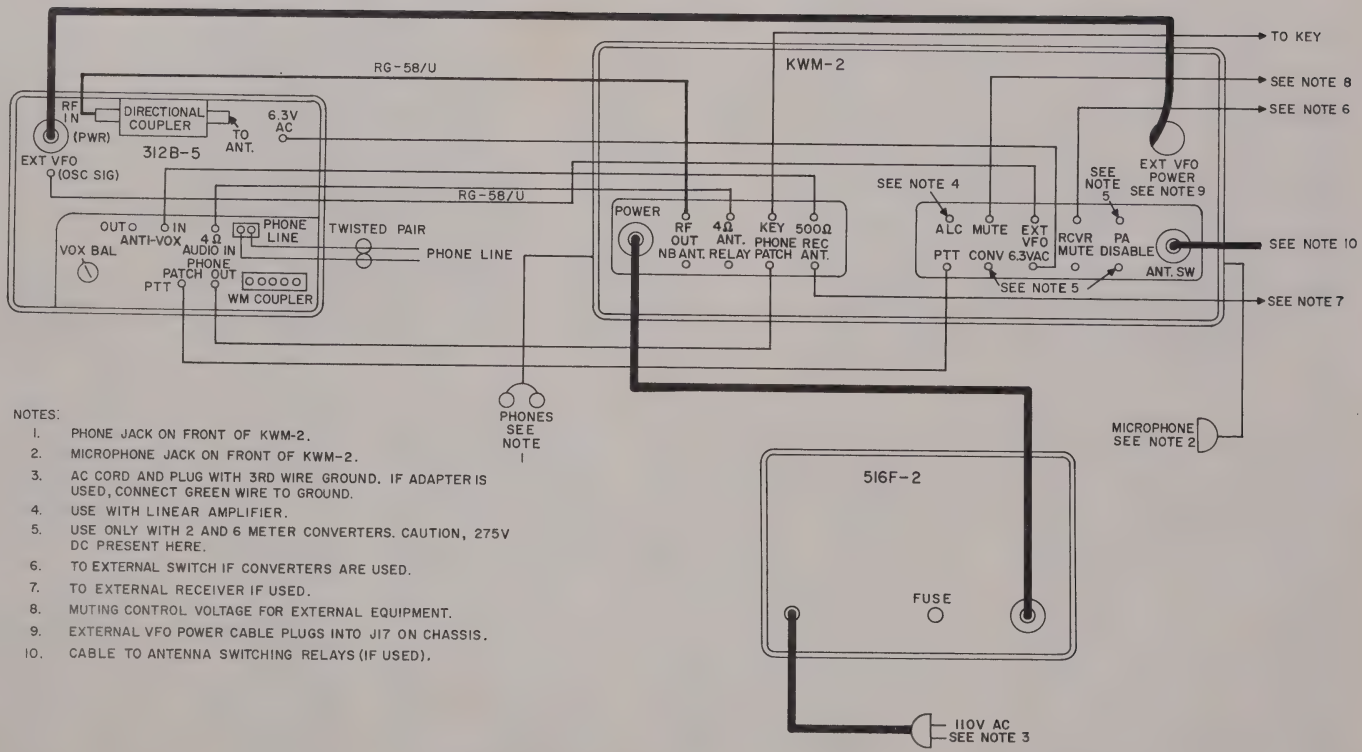


Figure 5. 6-db "H" Pad



NOTES:

1. PHONE JACK ON FRONT OF KWM-2.
2. MICROPHONE JACK ON FRONT OF KWM-2.
3. AC CORD AND PLUG WITH 3RD WIRE GROUND. IF ADAPTER IS USED, CONNECT GREEN WIRE TO GROUND.
4. USE WITH LINEAR AMPLIFIER.
5. USE ONLY WITH 2 AND 6 METER CONVERTERS. CAUTION, 275V DC PRESENT HERE.
6. TO EXTERNAL SWITCH IF CONVERTERS ARE USED.
7. TO EXTERNAL RECEIVER IF USED.
8. MUTING CONTROL VOLTAGE FOR EXTERNAL EQUIPMENT.
9. EXTERNAL VFO POWER CABLE PLUGS INTO J17 ON CHASSIS.
10. CABLE TO ANTENNA SWITCHING RELAYS (IF USED).

Figure 6. Interconnections, 312B-5 with KWM-2/2A

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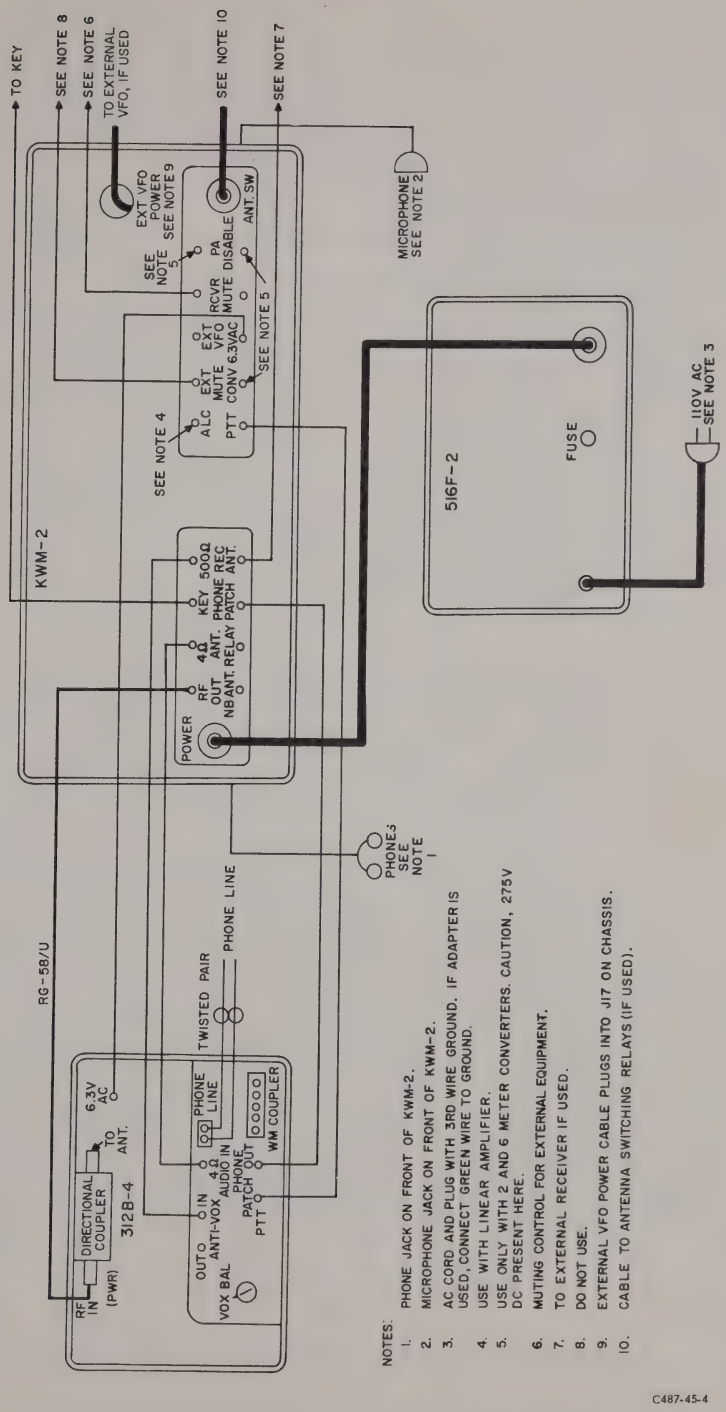

Figure 7. Interconnections, 312B-4 with KWM-2/2A

content, manually switch the phone patch back and forth from REC ONLY to XMIT ONLY.

3.1.3 OPERATION OF DIRECTIONAL COUPLER AND WATTMETER.

The transmitter output power that can be handled safely is relative to the swr on the transmission line. If the swr is extremely high, as when the line is open or shorted, it is possible to obtain a forward power indication of up to two kilowatts with very little power output from the transmitter. To avoid damage to the instrument, carefully observe the following operating procedure:

a. Set the wattmeter switch to the FORWARD 200 position. (If a linear amplifier is in use, set switch to FORWARD 2000 position.)

b. Couple rf into the transmission line using CW emission. The meter should show a forward power indication. Note the reading.

c. Switch to the appropriate REFLECTED scale. Unless the antenna or load is perfectly matched to the transmission line (52 ohms, resistive), the meter will indicate reflected power. Note the reading.

d. The forward and reflected power readings, in conjunction with the chart of figure 9, can be used to compute vswr. In some cases, it will be convenient to multiply the forward and reflected power readings by a factor of 10. The method of reading swr from the chart remains the same. For example, 50 watts forward and 5 watts reflected result in a value of swr slightly less than 2 to 1. Power levels of 500 watts forward and 50 watts reflected produce the same value of swr.

CAUTION

In applications where doubt exists in regard to expected power output from the transmitter, always select the highest wattmeter scale first and, if necessary, switch to the lower scale. This will prevent damage to the indicator. If testing is to be done with the transmitter connected to an antenna, the initial tests should be performed at low power levels until the antenna is adjusted for an swr of less than 2 to 1. An swr greater than 2 to 1 will cause high voltages to build up in the output circuits of the transmitter and possibly cause an arc-over or a short.

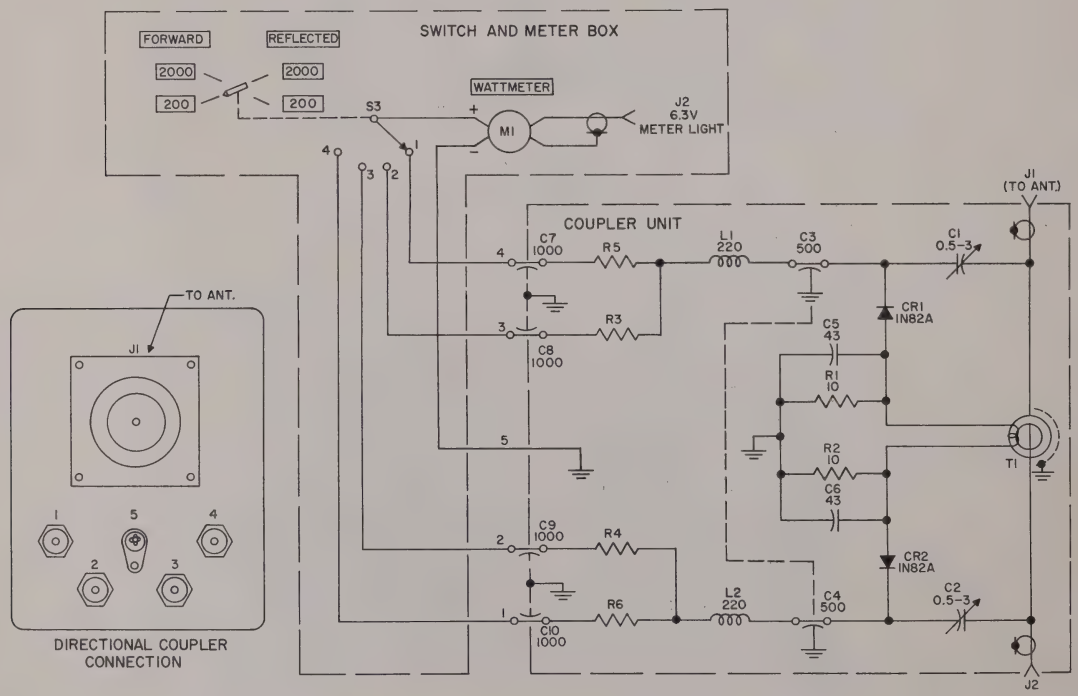

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Figure 8. Wattmeter Interconnections

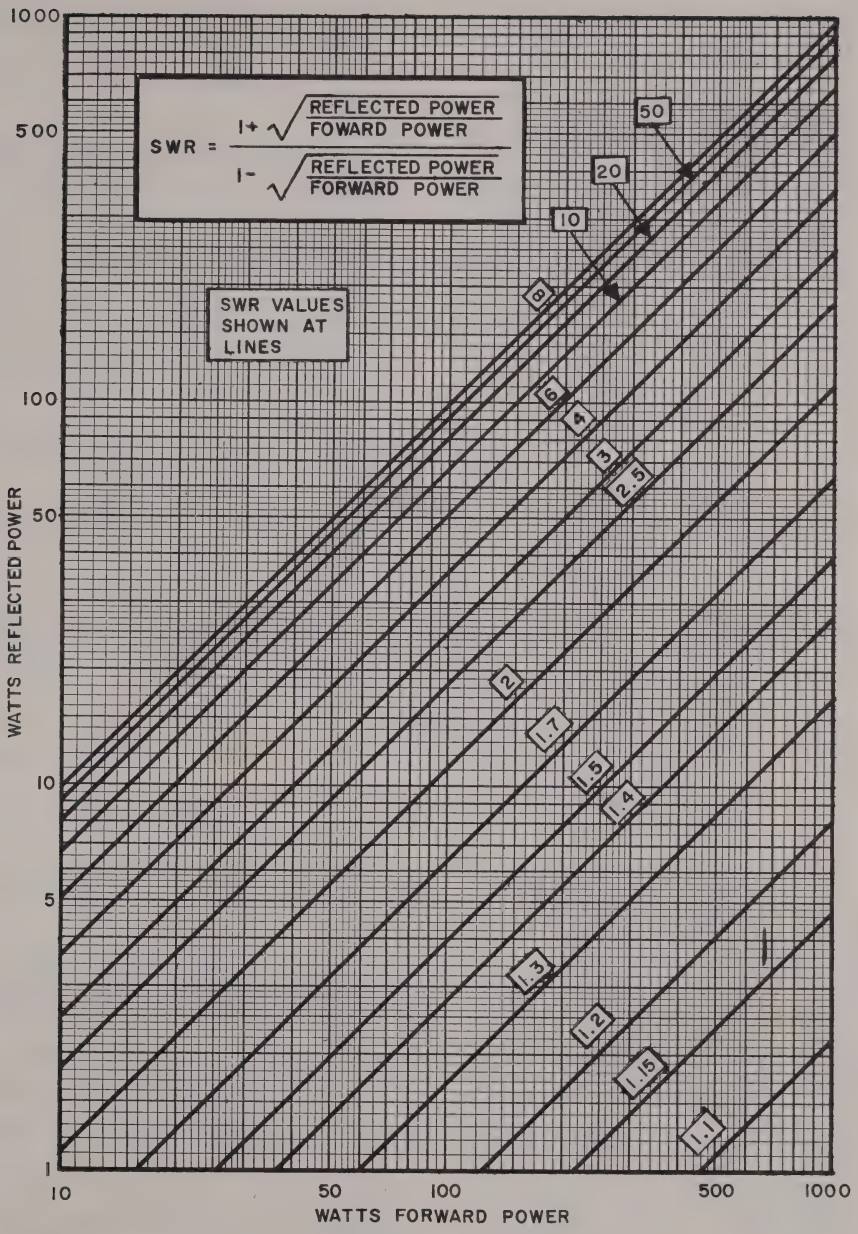


Figure 9. VSWR Graph for Forward Vs Reflected Power .

C189-01-1X

If the reflected power indication is greater than the forward power indication, it is probable that the coupler unit has been improperly installed. Check to make sure that the coupler has not been installed backwards in the transmission line. Also make sure that the dc meter leads have not been reversed.

e. If forward and reflected power indications are equal, or reflected power is nearly equal to forward power, the swr on the line is extremely high. This usually indicates a shorted, open, or very poorly terminated line. The coupler will respond to harmonic and other spurious output as well as to rf output at the desired frequency. If the transmitter output contains a high level of spurious emission, a high swr indication may be obtained even if the transmission line is terminated properly.

3.1.4 OPERATION OF STATION CONTROL SWITCHES.

Table 2 lists operating conditions for the various settings of FUNCTION and PHONE PATCH switches in 312B-4 and 312B-5 Station Controls.

TABLE 2. OPERATION OF PHONE PATCH AND FUNCTION SWITCHES

FUNCTION SWITCH POSITIONS	PHONE PATCH SWITCH POSITIONS		
	ON	OFF	STATION MUTE
NORMAL	Speaker dead, MIC dead, PTT operative, VOX operative, patch connected.	Speaker live, MIC live, PTT operative, VOX operative, patch disconnected.	Speaker dead, MIC dead, transmitter input grounded*, PTT inoperative.
RECEIVE ONLY	Speaker dead, transmitter input grounded*, PTT inoperative, MIC dead, patch hears receiver.	Speaker live, PTT inoperative, transmitter input grounded*, patch disconnected.	Same as above.
TRANSMIT ONLY	Speaker dead, PTT operative, MIC dead, anti-vox voltage grounded.	Speaker dead, PTT operative, MIC live, anti-vox voltage grounded.	Same as above.
*PHONE PATCH OUT jack (J4) shorted.			

3.1.5 OPERATION OF VFO IN 312B-5.

The switch positions of the VFO switch designate the two oscillators as number 1 and 2. Number 1 is the vfo in the KWM-2 (or KWM-2A). Number 2 is the vfo in the 312B-5. The vfo switching arrangement allows instant selection of either of two preset frequencies within the band (one for net frequency and one for net QSY frequency), scanning for a clear channel in case of severe interference, and checking the local transmitter frequency for interference while working d-x.

a. With VFO selector switch in the REC 1 - XMIT 2 position, the receiver frequency is controlled by the dial setting of the KWM-2/2A, and the transmitter frequency is controlled by the dial setting of the 312B-5. This allows the transmit circuits to be set within one portion of the band and the receive circuits within another. For example, with the 312B-5 dial set to 14.296 MHz and the EMISSION switch on the KWM-2/2A set to TUNE, the transmit circuits may be peaked and the PA loaded. The EMISSION switch is then set back to the desired sideband or CW, and the KWM-2/2A dial tuned to a desired receiving frequency between 14.3 and 14.350 MHz. Refer to table 3.

TABLE 3
KWM-2/2A AND 312B-5 APPROXIMATE VFO FREQUENCY SEPARATION LIMITS

	BANDS MHz				
	3.4-4	7-7.4	14-14.4	21-21.6	28-30
Approximate limit of separation between 312B-5 and KWM-2/2A dials	15 kHz	30 kHz	50 kHz	75 kHz	100 kHz

b. With the VFO selector switch in the REC 1 - XMIT 1 position, both the receiver and transmitter frequencies are the same and are controlled by the vfo in the transceiver.

c. With the VFO selector switch in the REC 2 - XMIT 2 position, both the receiver and the transmitter frequencies are the same and are controlled by the vfo in the 312B-5. The vfo dial in the 312B-5 can be calibrated in this position using the crystal calibrator signal and zero set knob as outlined in the KWM-2/2A instruction book. With the 312B-5 VFO switch set in REC 1 - XMIT 1 position, the KWM-2/2A can be tuned and loaded to one selected frequency within the legal amateur band using the KWM-2/2A tuning dial. The VFO switch can then be changed to REC 2 - XMIT 2 position, and the 312B-5 dial adjusted to another selected frequency within the same band. Transceiver operation can then be changed instantly from one frequency to the other by operating the VFO switch on the 312B-5 back and forth between the two positions marked REC 1 - XMIT 1 and REC 2 - XMIT 2. This permits presetting to a net frequency and a net QSY frequency, and the instant selection of either during net operation. Frequency separation limits listed in table 1 should not be exceeded by any great extent. If they are exceeded, the result is decreased receiver sensitivity or transmitter PA grid drive (or both) due to the selectivity of the transceiver rf tuned circuits. The best compromise for this tuned circuit attenuation effect is to tune and load the KWM-2/2A at a frequency midway between the two desired frequencies and then set the 312B-5 and KWM-2/2A dials to the required frequencies.

4.1 Maintenance.

4.1.1 GENERAL.

Figure 13 shows the schematic diagram for the 312B-4 and 312B-5 Station Controls. Figures 10, 11, and 12 consist of parts identification and location for the directional coupler and phone patch used in the 312B-4 and 312B-5.

If excessive oscillator drift is experienced, replace V301. The oscillator tube V301 can be replaced without upsetting the calibration accuracy of the oscillator.

For repairs which will affect the calibration of the directional coupler, it is recommended that the unit be returned to the factory. Laboratory instruments must be used to assure accurate calibration.

4.1.2 VFO DIAL CALIBRATION.

The vfo alignment in the 312B-5 can be adjusted to coincide at the end points (0 to 200) with the vfo in the KWM-2/2A. If necessary, align the vfo in the KWM-2/2A before proceeding with the 312B-5 alignment. Refer to the Service Instructions section in the transceiver instruction book. Align the vfo in the 312B-5 as follows:

a. Set VFO switch on 312B-5 to REC 1 - XMIT 1 and FUNCTION switch to NORM.

b. Tune to zero beat with calibrate signal at 200 end of KWM-2/2A dial.

c. Set VFO switch on 312B-5 to REC 2 - XMIT 2 position.

d. Tune vfo in 312B-5 to zero beat at the 200 end of dial, and set hairline to 200 with zero set knob.

e. Repeat steps a, b, and c, at 0 end of dial in KWM-2/2A.

f. Tune vfo in 312B-5 to zero beat at 0 end of dial. Do not move the hairline. Zero beat should occur within ±1 kc of 0 on the 312B-5 dial.

g. If zero beat does not occur within the limits stated in step f, reduce the end-point spread by adjusting L302 as outlined in the KWM-2/2A Instruction Book.

h. If necessary, loosen the setscrews in the 312B-5 dial hub, and move the dial relative to the oscillator shaft so that the hairline is approximately vertical when the dial is calibrated.

i. Recheck for end-point spread, and make additional minor adjustments, if required.

j. Make the sideband frequency shift adjustment as outlined in paragraph 4.1.3.

4.1.3 VFO SIDEBAND FREQUENCY SHIFT ADJUSTMENT.

a. Set controls of 312B-5 as follows: VFO selector to REC 2 - XMIT 2, FUNCTION selector to NORM.

b. Set controls of KWM-2/2A as follows: BAND switch to 3.6, EXCITER TUNING to approximately 1.9 on logging scale, EMISSION switch to LSB, and OFF-ON-NB-CAL switch to CAL position. Tune dial near 100 until calibrate signal is zero beat. Do not move dial for following procedure.

c. Switch to USB, and adjust trimmer C308 (top of vfo can in 312B-5) for zero beat.

5.1 Specifications.

5.1.1 DIRECTIONAL COUPLER AND WATTMETER.

Frequency range . . .	2 to 30 MHz.
Impedance	52 ohms unbalanced
Wattmeter scales . . .	200 watts, forward 2000 watts, forward 200 watts, reflected 2000 watts, reflected
Size	10-3/4 inches w x 7-1/2 ft h x 11-3/4 ft d including feet
Weight	8-1/2 lb
Maximum power handling capability . .	2000 watts forward power

Power loss through coupler. . . . . Less than 0.1 percent

Swr introduced by coupler. . . . . Less than 1.05:1, 2 to 30 MHz

5.1.2 PHONE PATCH.

Input impedance . . . . 600 ohms

Output impedance . . . 600 ohms

5.1.3 PM SPEAKER.

Impedance . . . . . 3 to 4 ohms

Size . . . . . 5 by 7 inches

5.1.4 VFO IN 312B-5.

Frequency range . . . 2.5 to 2.7 MHz.

Calibration accuracy . Within 1 kHz after midband calibration.

Drift . . . . . Less than 100 Hz after 30-minute warmup.

Dial backlash . . . . . Less than 50 Hz.

Power . . . . . Supplied by KWM-2 or KWM-2A transceiver power supply.

6.1 Parts List.

ITEM	DESCRIPTION	COLLINS PART NUMBER
	312B-4 STATION CONTROL	522-1167-00
	312B-5 STATION CONTROL	522-1668-00
C1	CAPACITOR, FIXED, PAPER: 1 uf +20% -10%, 200 vdcw	931-0170-00
C2, C3	CAPACITOR, FIXED, CERAMIC: 470 uuf +100	913-3007-00
C4, C5	-20%; 500 vdcw	
C6	CAPACITOR, FIXED, PAPER: 0.5 uf +20% -10%; 200 vdcw	931-0169-00
C7	CAPACITOR, FIXED, PAPER: 0.25 uf +20% -10%; 200 vdcw	931-0168-00
J1	JACK, TELEPHONE: spring leaf; 2 conductor plug	358-1050-00
J2, J3	JACK, TIP: ceramic insulation; phonograph type	360-0088-00
J4, J5		
J6, J7		
L1, L2	COIL, RADIO FREQUENCY: 2 mh; 50,000 ohms; 100 ma current rating	240-0134-00
LS1	LOUDSPEAKER, PERMANENT MAGNET: 4-9 w, nom, 3-4 ohms, 5 x 7 in. oval	271-0215-00
M1	AMMETER: D'Arsonval movement dc; internally illuminated	458-0467-00
R1, R2	RESISTOR, FIXED, COMPOSITION: 100 ohms	745-1310-00
R4, R5	±10%, 1/2 w	
R6		
R9		
R7	NOT USED	
R3, R8	RESISTOR, FIXED, COMPOSITION: 820 ohms ±10%, 1/2 w	745-1349-00
R10	RESISTOR, VARIABLE, COMPOSITION: 250C ohms ±30%; 1/4 watt	376-4728-00
R11, R12	RESISTOR, FIXED FILM: 619 ohms ±1%, 1/2 w	705-7586-00
R13, R15	RESISTOR, FIXED, COMPOSITION: 390 ohms ±10%, 1/2 w	745-1335-00
R14, R16	RESISTOR, FIXED, COMPOSITION: 270 ohms ±10%, 1/2 w	745-1328-00
S1	SWITCH, LEVER: 3 pole, 3 position (used in 312B-4 only)	259-0986-00
S1	SWITCH, LEVER: 3 pole, 3 position (used in 312B-5 only)	259-1132-00
S2	SWITCH, LEVER: 5 pole, 3 position; (used in 312B-4 only)	259-0987-00
S2	SWITCH, LEVER: 5 pole, 3 position (used in 312B-5 only)	259-1131-00
S3	SWITCH, ROTARY: 1 circuit, 4 position, 1 section	259-0966-00
T1, T2	TRANSFORMER, AUDIO FREQUENCY: 200 to 20,000 kc freq range	667-0326-00
	Directional Coupler	543-8118-004
C1, C2	CAPACITOR, VARIABLE; GLASS: 0.5 uf min, 3.0 uuf max.; concentric type	922-0149-00
C3, C4	CAPACITOR, FIXED, MICA: 500 uuf ±20%; 500 vdcw	912-0667-00
C5, C6	CAPACITOR, FIXED, CERAMIC: 43 uuf ±1%; 500 vdcw;	916-4675-00
C7, C8	CAPACITOR, FIXED, CERAMIC: 1000 uuf +80%	913-1292-00
C9, C10	-20%; 500 vdcw	
C11	NOT USED	
C12	NOT USED	
CR1, CR2	SEMICONDUCTOR DEVICE, DIODE: silicon; type 1N82A	353-2542-00
J1, J2	CONNECTOR: R-f type N, UG-58A/U	357-9003-00
L1, L2	COIL, RADIO FREQUENCY: 200 uh inductance; 1 amp	240-0037-00
R1, R2	RESISTOR, FIXED FILM: 10 ohms ±1%, 1/2 w	705-2356-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
†R3, R4	RESISTOR, FIXED, FILM: 5,100 ohms to 10,000 ohms ±1%, 1/4 w; IRC type MDB	705-7130-00 to 705-7144-00
†R5, R6	RESISTOR, FIXED, FILM: 787 ohms to 1780 ohms ±1%, 1/4 w; IRC type MDB	705-7091-00 to 705-7108-00
T1	COIL, RADIO FREQUENCY: 60 turns of #30 AWG; toroidal wound;	542-0916-002
	70K-2 Oscillator	522-1093-00
	70K-2 Oscillator consists of the following. This equipment should be returned to Collins Radio Company for repair.	
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913-0053-00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913-0054-00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913-0055-00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913-0056-00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913-0057-00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913-0058-00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913-0232-00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913-0233-00
*C301	CAPACITOR, CERAMIC: 20 uuf ±5%, 500 vdcw	913-0234-00
C302	CAPACITOR, MICA: 1000 uuf ±2%, 500 vdcw	912-1737-00
C303	CAPACITOR, MICA: 3000 uuf ±1%, 500 vdcw	912-1748-00
C304	CAPACITOR, MICA: 200 uuf ±2%, 500 vdcw	912-0514-00
**C305	CAPACITOR, CERAMIC: 100 uuf ±2%, 500 vdcw	913-0074-00
**C305	CAPACITOR, CERAMIC: 100 uuf ±2%, 500 vdcw	913-0246-00
C306, C307	CAPACITOR, CERAMIC: 0.02 uf +60% -40%; 250 vdcw	913-2097-00
C309, C310		
C308	CAPACITOR, VARIABLE, CERAMIC: 5 uuf min, to 37.5 uuf max, 350 vdcw	917-1073-00
CR301	SEMICONDUCTOR DEVICE, DIODE: germanium; type 1N34A	353-0103-00
L301	COIL, RADIO FREQUENCY; 22 turns #28 AWG double formvar, 2.4 uh inductance	240-0652-00
L302	TRIMMER ASSEMBLY: 9 turns #28 AWG wire, 1 toroid coil and hardware	543-7323-00
L303	INDUCTOR, TUNING: 10 turns #30 AWG wire	543-7333-003
L304	COIL, RADIO FREQUENCY: single layer wound, magnet wire, 3.30 uh	240-0695-00
R301, R303	RESISTOR, COMPOSITION: 0.10 megohm ±10%, 1/2 w	745-1436-00
R302	RESISTOR, COMPOSITION: 82,000 ohms ±5%, 1/2 w	745-1432-00
T301	TRANSFORMER, RADIO FREQUENCY: pri 380 uh nom 790 kc; sec 2.7 uh nom, 2.6 mc	240-0665-00
V301	ELECTRON TUBE: type 6AU6	255-0202-00
	Following parts used in 312B-5 only:	
DS401	LAMP, INCANDESCENT: type 47	262-3240-00
J402	JACK, TIP: ceramic insulation, phonograph type	360-0088-00
P17	CONNECTOR, POWER: 9 male contacts, fits miniature tube socket	372-1822-00
R401	RESISTOR, COMPOSITION: 15,000 ohms ±10%, 1 w	745-3401-00
R402	RESISTOR, COMPOSITION: 33,000 ohms ±10%, 2 w	745-5715-00
S401	SWITCH, ROTARY: 3 pole, 3 position	259-1108-00

*Chosen per operational requirement.
**Selected in final test.
†Selected in manufacture to calibrate meter.

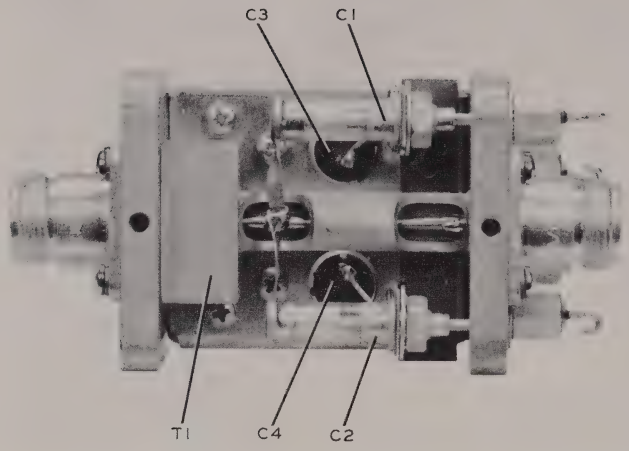


Figure 10. Directional Coupler, Top View, Parts Location C487-15-P

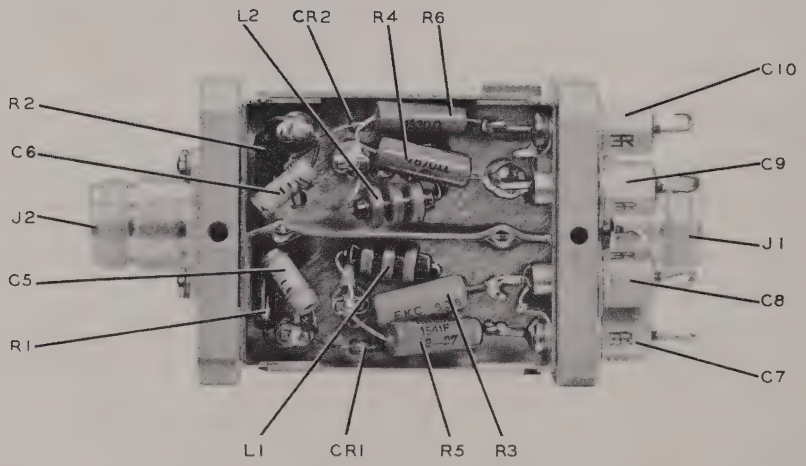


Figure 11. Directional Coupler, Bottom View, Parts Location C487-16-P

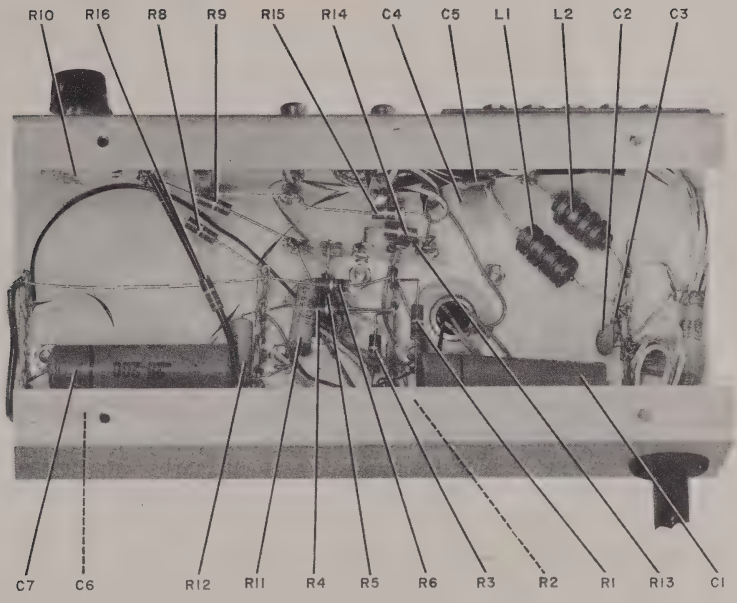
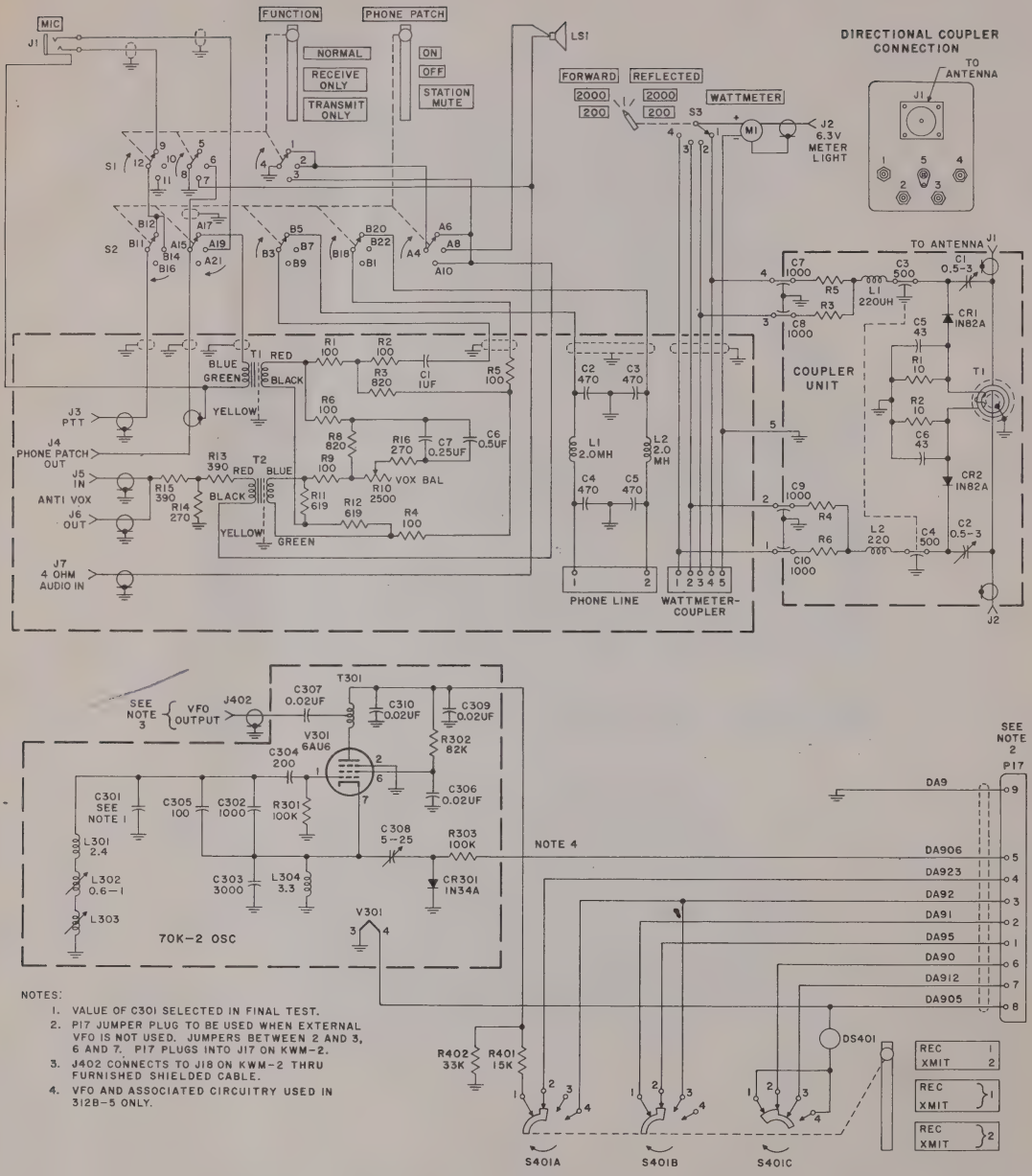


Figure 12. Phone Patch, Bottom View, Parts Location

C569-05-P



NOTES:

1. VALUE OF C301 SELECTED IN FINAL TEST.
2. P17 JUMPER PLUG TO BE USED WHEN EXTERNAL VFO IS NOT USED. JUMPERS BETWEEN 2 AND 3, 6 AND 7. P17 PLUGS INTO J17 ON KWM-2.
3. J402 CONNECTS TO J18 ON KWM-2 THRU FURNISHED SHIELDED CABLE.
4. VFO AND ASSOCIATED CIRCUITRY USED IN 312B-5 ONLY.

Figure 13. 312B-4 and 312B-5, Schematic Diagram

COLLINS